REMARKS

The Office Action dated January 23, 2008, has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

By this Response, claims 21, 23-28, 30-32, 36-38, and 40-42 have been amended to more particularly point out and distinctly claim the subject matter of the present invention. Claims 43-47 have been added. Claim 34 has been cancelled without prejudice or disclaimer. No new matter has been added. Support for the above amendments is provided in the Specification on at least page 11, line 5, to page 13, line 18, and page 18, line 18, to page 20, line 12. Accordingly, claims 21, 23-28, 30-33, 36-38, and 40-47 are currently pending in the application, of which claims 21, 32, 38, and 43 are independent claims.

In view of the above amendments and the following remarks, Applicants respectfully request reconsideration and timely withdrawal of the pending rejections to the claims for the reasons discussed below.

Claim Rejections under 35 U.S.C. §102(e)

The Office Action rejected claims 21, 23-26, 28, 30, 38, and 40-42 under 35 U.S.C. §102(e) as allegedly anticipated by Zangi, *et al.* (U.S. Patent No. 6,775,322) ("Zangi") The Office alleged that Zangi discloses or suggests every feature recited in

claims 21, 23-26, 28, 30, 38, and 40-42. Applicants respectfully submit that the claims recite subject matter that is neither disclosed nor suggested in Zangi.

Claim 21, upon which claims 23-28 and 30-31 depend, recites an apparatus. The apparatus includes a signal filter configured to filter a signal from a signal receiver, and a signal estimator configured to estimate channel operations of the signal from the signal filter. The apparatus also includes a signal optimizer configured to generate optimized values for the signal from the signal filter, and a decision feedback sequence estimator configured to receive the generated optimized values. The decision feedback sequence estimator includes a prefilter, a summing element, a feedback filter, and a maximum likelihood sequence estimator. An interconnection of the prefilter, the feedback filter, the maximum likelihood sequence estimator, and the summing element is configured to permit concurrent interference and prefilter operations to be performed.

Claim 38, upon which claims 40-42 depend, recites an apparatus. The apparatus includes signal filter means for filtering a signal from a signal receiver, and signal estimator means for estimating channel operations of the signal from the signal filter means. The apparatus also includes signal optimizer means for generating optimized values for the signal from the signal filter means, and interference cancellation means for receiving the generated optimized values to perform concurrent interference and prefilter operations. The interference cancellation means includes prefilter means, summing means for summing inputs from the prefilter means, feedback filter means for filtering optimized values and a summed output from the signal optimizer means and the summing

means, respectively, and maximum likelihood sequence estimating means for generating maximum-likelihood values from the summing means. An interconnection of the prefilter means, the feedback filter means, the maximum likelihood sequence estimating means, and the summing means is configured to permit the concurrent interference and prefilter operations to be performed.

As will be discussed below, Zangi fails to disclose or suggest every feature recited in claims 21, 23-26, 28, 30, 38, and 40-42, and therefore fails to provide the features of the claims discussed above.

Zangi is directed to a method for computing a coefficient of a finite impulse response pre-filter applied prior to a decision algorithm in an equalizer having adjustable filter coefficients. Computations performed to compute the filter coefficients for a right half burst may be used to compute the prefilter for a left hand burst, reducing the number of computations. A square root-free algorithm may be used to solve the system of linear equations, reducing computational complexity (Zangi, Abstract; col. 2, lines 8-39).

Applicants respectfully submit that Zangi fails to disclose or suggest every feature recited in claim 21, and similarly recited in claim 38. Specifically, Zangi fails to disclose or suggest, at least, "a decision feedback sequence estimator configured to receive the generated optimized values, wherein the decision feedback sequence estimator comprises a prefilter, a summing element, a feedback filter, and a maximum likelihood sequence estimator" as recited in claim 21, and similarly recited in claim 38.

Rather, Zangi discloses equalizer 100, which may be a decision feedback equalizer (DFE) or a decision feedback sequence estimation (DFSE) equalizer. Equalizer 100 includes an equalization filter 101, a decision algorithm 108, and a processor 120. Equalization filter 101 includes a prefilter 102, feedback filter 104, and a summer 106. Processor 120 includes channel estimator 122 and adaptive algorithm 124 (Zangi, Figures 1 and 3; col. 3, line 29, to col. 4, line 60).

The Office Action asserted that Zangi discloses that circuits 101 (equalization filter 101) and 108 (decision algorithm 108) together describe the decision feedback estimator which includes prefilter 102, feedback filter 104, and summing device 106. The Office Action further asserted that the estimator 122 (channel estimator) and circuit 124 (adaptive algorithm) teach the features for the signal estimator and the signal optimizer, respectively, recited in claim 21, and similarly recited in claim 38 (See Office Action on pages 2-3). Applicants respectfully disagree with the Office Action's assertions.

As previously noted, Applicants respectfully submit that both the adaptive algorithm 124 and the channel estimator 122 are part of the processor 120 of the DFE/DFSE equalizer 100. The channel estimator 122 estimates the impulse response of the communication channel and the adaptive algorithm 124 computes filter coefficients of the pre-filter 102 and the feedback filter 104 *within DFE/DFSE equalizer 100.* Therefore, Zangi discloses generating optimized values *within DFE/DSE equalizer 100*; therefore, the DFE/DFSE 100 is not configured to receive the generated optimized

values. Accordingly, Zangi fails to disclose or suggest, at least, "a decision feedback sequence estimator configured to receive the generated optimized values, wherein the decision feedback sequence estimator comprises a prefilter, a summing element, a feedback filter, and a maximum likelihood sequence estimator" as recited in claim 21, and similarly recited in claim 38.

Claims 23-26, 28, and 30 depend from claim 21. Claims 40-42 depend from claim 38. Accordingly, claims 23-26, 28, 30, and 40-42 should be allowable for at least their dependency upon an allowable base claim, and for the specific limitations recited therein.

Therefore, Applicants respectfully request withdrawal of the rejections of claims 21, 23-26, 28, 30, 38, and 40-42 under 35 U.S.C. §103(a), and respectfully submit that claims 21 and 38, and the claims that depend therefrom, are in condition for allowance.

Claim Rejections under 35 U.S.C. §103(a)

Claim 27

The Office Action rejected claim 27 under 35 U.S.C. §103(a) as being allegedly unpatentable as obvious over Zangi, *et al.* (U.S. Patent No. 6,775,322) ("Zangi") in view of Taylor (U.S. Patent Publication No. 2002/0197987) ("Taylor"). Applicants respectfully submit that the claims recite subject matter that is neither disclosed nor suggested in the combination of Zangi and Taylor.

Zangi was discussed above. Taylor is directed to a transparent data transmission for a wireless/cellular communication system. An analog signal from a modem or other

source is converted at a remote station to a digital bit stream in accordance with a memoryless compaction rule. The resultant bit stream is then transmitted through a transparent channel that includes a wireless cellular-telephone link. At the base station, that bit stream is transmitted over a public-switched-network span (Taylor, Abstract; paragraphs [0003]-[0005]).

As previously noted above, Zangi fails to disclose or suggest every feature recited in claim 21. Taylor fails to cure the deficiencies of Zangi. Specifically, Taylor fails to disclose or suggest, at least, "a decision feedback sequence estimator configured to receive the generated optimized values, wherein the decision feedback sequence estimator comprises a prefilter, a summing element, a feedback filter, and a maximum likelihood sequence estimator" as recited in claim 21. Accordingly, Zangi in view of Taylor fails to disclose or suggest every feature recited in claim 21.

Claim 27 depends from claim 21. Accordingly, claim 27 should be allowable for at least its dependency upon an allowable base claim, and for the specific limitations recited therein.

Therefore, Applicants respectfully request withdrawal of the rejection of claim 27 under 35 U.S.C. §103(a), and respectfully submit that claim 21, and the claims that depend therefrom, are in condition for allowance.

Claims 31-34 and 36

The Office Action rejected claims 31-34 and 36 under 35 U.S.C. §103(a) as being allegedly unpatentable as obvious over Zangi in view of Malkemes, *et al.* (U.S. Patent Publication No. 2002/0106040) ("Malkemes"). Applicants respectfully submit that the claims recite subject matter that is neither disclosed nor suggested in the combination of Zangi and Malkemes.

Claim 32, upon which claims 33-34 and 36-37 depend, recites a method. The method includes receiving a data vector, forming optimized feed forward filter parameters from the data vector, and forming optimized feedback filter parameters from the data vector. The method also includes transmitting the optimized feed forward filter parameters and the optimized feedback filter parameters to a decision feedback sequence estimator. The decision feedback sequence estimator includes a feed forward filter and a feedback filter. The method also includes applying the optimized feed forward filter parameters to the feed forward filter to define filter characteristics of the feed forward filter, applying the optimized feedback filter parameters to the feedback filter to define filter characteristics of the feedback filter, and simultaneously performing interference cancellation and pre-filtering operations on the data vector through operation of the feed forward and feedback filters. Receiving the data vector includes receiving a plurality of data vectors on a corresponding plurality of receiving chains.

As will be discussed below, Zangi in view of Malkemes fails to disclose or suggest every feature recited in claims 31-34 and 36, and therefore fails to provide the features of the claims discussed above.

Zangi was discussed above. Malkemes is directed to a method and apparatus for reducing multipath distortion in a wireless IAN system. A spatial diversity combiner includes a plurality of feed forward equalizers (FFEs), a decision feedback equalizer (DFE), and a tap control circuit. The plurality of FFEs receive spatially diverse replicas of an RF signal and optimally combine them. The DFE provides feedback for tap weight control and optimal equalization of the transmission channel. Symbol error is generated by a slicer circuit or by a maximum likelihood sequence estimation (MLSE) process (Malkemes, Abstract; paragraph [0006]).

As previously noted above, Zangi fails to disclose or suggest every feature recited in claim 21. Malkemes fails to cure the deficiencies of Zangi. Specifically, Malkemes fails to disclose or suggest, at least, "a decision feedback sequence estimator configured to receive the generated optimized values, wherein the decision feedback sequence estimator comprises a prefilter, a summing element, a feedback filter, and a maximum likelihood sequence estimator" as recited in claim 21. Accordingly, Zangi in view of Malkemes fails to disclose or suggest every feature recited in claim 21.

Assuming *arguendo* that the teachings of Zangi and the teachings of Malkemes could be combined, the combination of Zangi and Malkemes fails to disclose or suggest, at least, "forming optimized feed forward filter parameters from the data vector; forming

optimized feedback filter parameters from the data vector; transmitting the optimized feed forward filter parameters and the optimized feedback filter parameters to a decision feedback sequence estimator, wherein the decision feedback sequence estimator comprises a feed forward filter and a feedback filter" as recited in claim 32.

Rather, as noted above for claims 1 and 38, Zangi discloses that both the adaptive algorithm 124 and the channel estimator 122 are part of the processor 120 of the DFE/DFSE equalizer 100. The channel estimator 122 estimates the impulse response of the communication channel and the adaptive algorithm 124 computes filter coefficients of the pre-filter 102 and the feedback filter 104 *within DFE/DFSE equalizer 100.* Furthermore, Zangi discloses receiver front-end 16 including a filter which is ideally matched to the impulse response of transmitter 12. Receiver front-end 16 amplifies the received signal and down converts the received signal to a baseband frequency. The output of the receiver front-end 16 is sampled periodically by the sampler 18, which converts the received signal to a discrete sequence, r(k). Sequence r(k) is then transmitted to DFE/DFSE equalizer 100. Accordingly, Zangi is silent regarding the aforementioned features recited in claim 32.

Therefore, Zangi fails to disclose or suggest, at least, "forming optimized feed forward filter parameters from the data vector; forming optimized feedback filter parameters from the data vector; transmitting the optimized feed forward filter parameters and the optimized feedback filter parameters to a decision feedback sequence

estimator, wherein the decision feedback sequence estimator comprises a feed forward filter and a feedback filter" as recited in claim 32 (emphasis added).

Malkemes fails to cure the deficiencies of Zangi regarding these features recited in claim 32.

Claim 31 depends from claim 21. Claims 33-34 and 36 depend from claim 32. Accordingly, claims 31, 33-34, and 36 should be allowable for at least their dependency upon an allowable base claim, and for the specific limitations recited therein.

Therefore, Applicants respectfully request withdrawal of the rejections of claims 31-34 and 36 under 35 U.S.C. §103(a), and respectfully submit that claims 21 and 32, and the claims that depend therefrom, are in condition for allowance.

Claim 37

The Office Action rejected claim 37 under 35 U.S.C. §103(a) as being allegedly unpatentable as obvious over Zangi in view of Malkemes, and further in view of Taylor. Applicants respectfully submit that the claims recite subject matter that is neither disclosed nor suggested in the combination of Zangi, Taylor, and Malkemes.

Zangi, Taylor, and Malkemes were discussed above.

As previously noted above, Zangi in view of Malkemes fails to disclose or suggest every feature recited in claim 32. Taylor fails to cure the deficiencies of Zangi and Malkemes. Specifically, Taylor fails to disclose or suggest, at least, "forming optimized feed forward filter parameters from the data vector; forming optimized feedback filter

parameters from the data vector; transmitting the optimized feed forward filter parameters and the optimized feedback filter parameters to a decision feedback sequence estimator, wherein the decision feedback sequence estimator comprises a feed forward filter and a feedback filter" as recited in claim 32. Accordingly, Zangi in view of Malkemes, and further in view of Taylor, fails to disclose or suggest every feature recited in claim 32.

Claim 37 depends from claim 32. Accordingly, claim 37 should be allowable for at least its dependency upon an allowable base claim, and for the specific limitations recited therein.

Therefore, Applicants respectfully request withdrawal of the rejection of claim 37 under 35 U.S.C. §103(a), and respectfully submit that claim 32, and the claims that depend therefrom, are in condition for allowance.

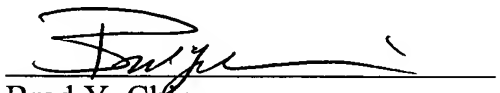
CONCLUSION

In conclusion, Applicants respectfully submit that Zangi, Taylor, and Malkemes, alone or in combination, fail to disclose or suggest every claim feature recited in claims 21, 23-28, 30-34, 36-38, and 40-47. The distinctions previously noted are more than sufficient to render the claimed invention unanticipated and non-obvious. It is therefore respectfully requested that all of claims 21, 23-28, 30-34, 36-38, and 40-47 be allowed, and this present application be passed to issuance.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, Applicants' undersigned representative at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,



Brad Y. Chin
Attorney for Applicants
Registration No. 52,738

Customer No. 32294
SQUIRE, SANDERS & DEMPSEY LLP
14TH Floor
8000 Towers Crescent Drive
Tysons Corner, Virginia 22182-2700
Telephone: 703-720-7800
Fax: 703-720-7802

BYC:dlh

Enclosures: Petition for Extension of Time
Additional Claim Fee Transmittal
Check No. 018946